TRADITIONAL SUPERCOMPUTING IS DEAD

How a New Zealand company can reduce SKA compute power requirements by an order of magnitude while actually increasing processing capacity.

SKA Colloquium
Auckland University of Technology
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CEO Nyriad Limited

The number one problem facing big science computing?

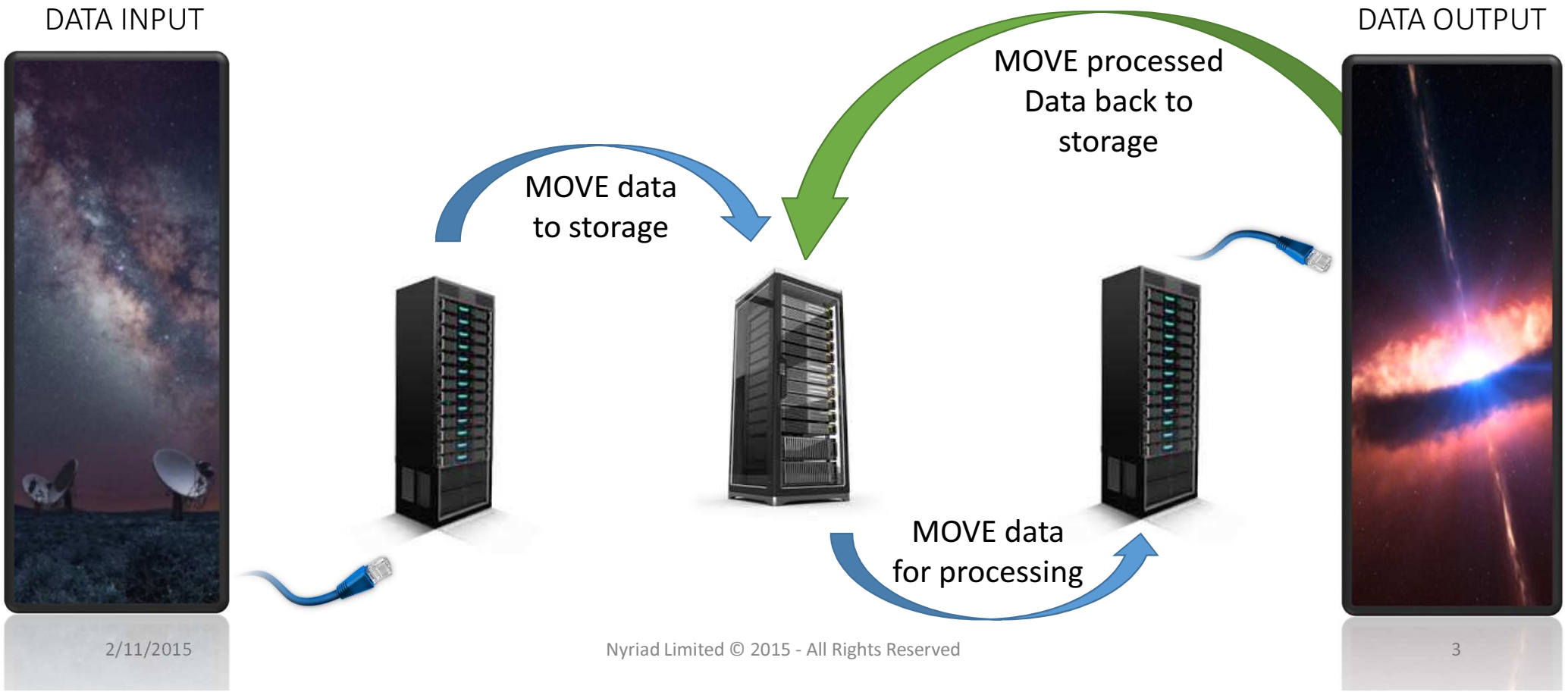
The cost of the power required to run a Super Computer over 10 years

Most supercomputers are **not viable** to continue To use **after 5-7 years, due to their relative power cost increase**

They may have high processing speed, but the **topology is I/O bound** – thus the speed is lost on the network

100PetaFlops at current technology performance requires 20MW

Moving data from storage to processing wastes energy and slows processing



NYRIAD CREATES A NEW STATE OF DATA

Traditionally there have only been two states of data.

Data can be transformed in real-time into a new Fluid State.

Raw

Compressed

ORIGINAL RAW DATA	COMPRESSED DATA	PARALLEL DATA PROPULSION
Low density	High density	Very high density
Slow I/O bound processing	Data cannot be processed	Very fast processing (compute faster than I/O)
Random access to raw data is available for processing	Data must be decompressed back to raw form before processing can occur	Data assumes whatever form is requested on demand

Nyriad™ has developed a revolutionary product bringing together two major tech advances,
Low-power mobile GPUs &
Parallel Data Propulsion architecture
(*such as PriaPress compression for SKA*).

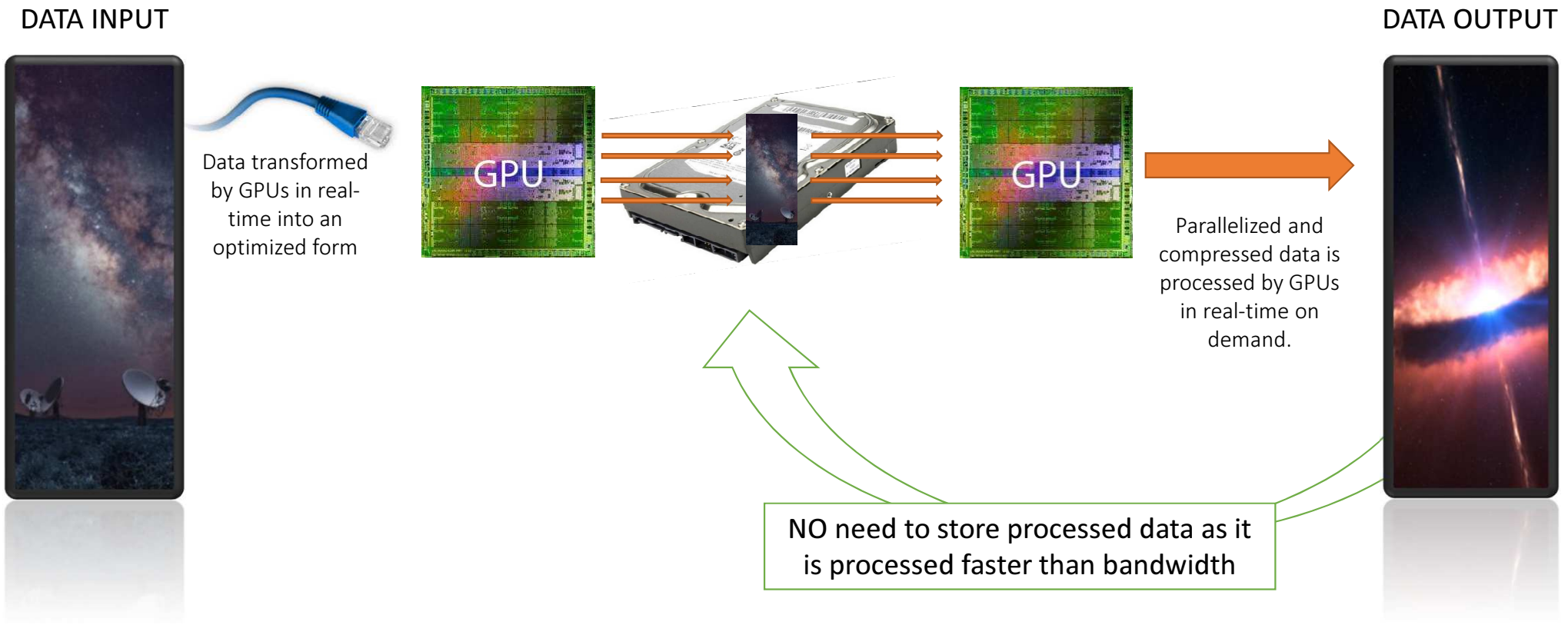
Introducing the worlds first palm sized data center.

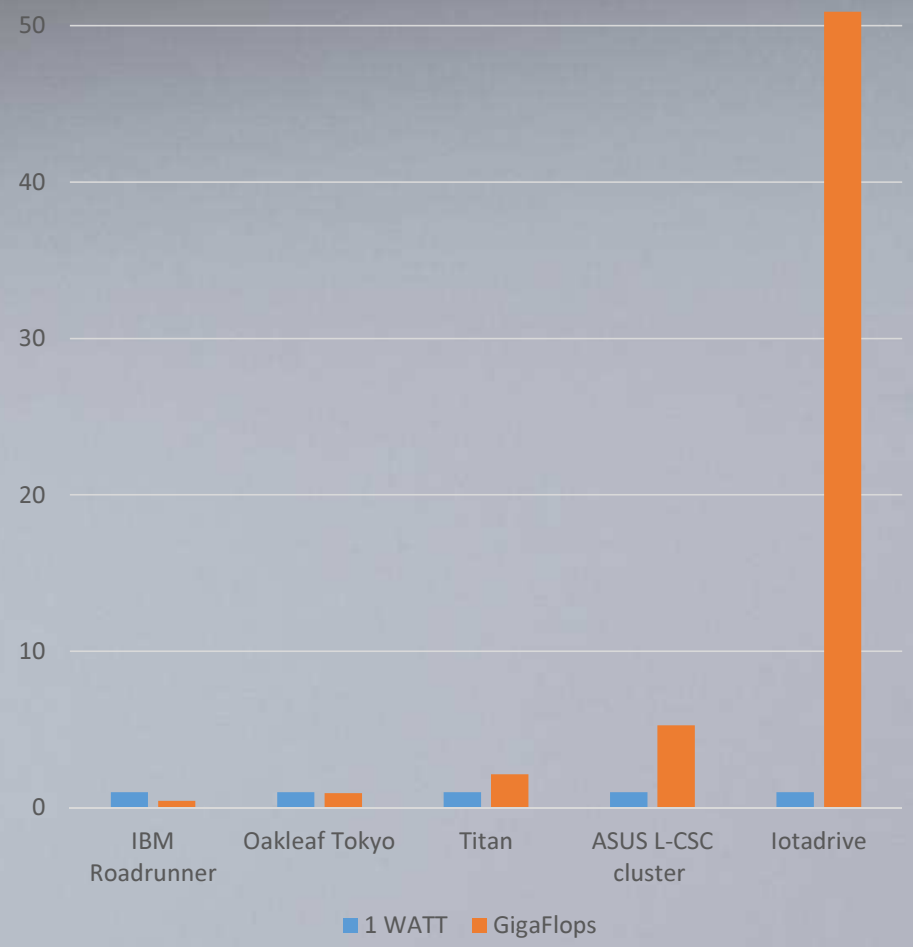
iOTADRIVE™

No moving parts, fans, no need for external power supply, racks, air filters, security, UPS or special cooling required

- 1024 GPU cores (2.8 Teraflop processing – 32bit Floats)
- 32 x 64bit ARM cores
- 32 GB RAM
- 6 TB SSD
- 2 x 12Gb/s Fiber channel
- 2 x 10Gb/s Ethernet
- 1 USB 3.0 ports
- 2 x 12Gb/s SAS ports
- 12hr Internal UPS
- Supports 4 x VDI users @ 4K
- GPS/Accelerometer
- 5VDC - Peak 55 watts - Idle 3 watts
- 1” x 4” x 5.75” (standard Hard Drive format)
- **iotadrive Parallel Data Propulsion architecture**
- **8 x external 25.6 GBytes/s bus ports for increased scalable computing**

When you don’t need to move data
Bandwidth is infinite





50 GigaFlops per 1 Watt

Over 10x more efficient
than the best supercomputer….

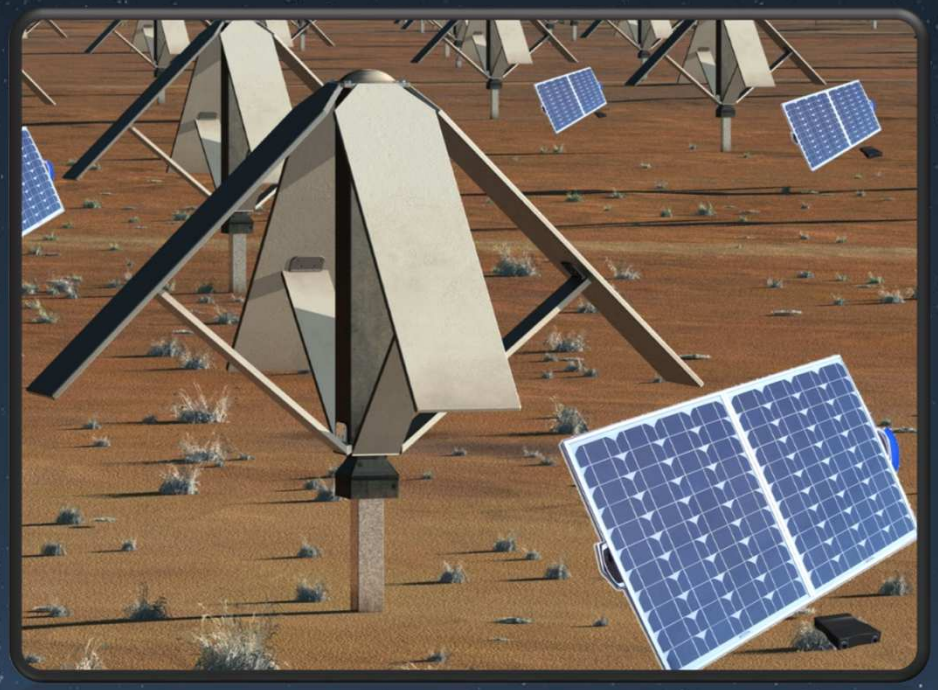
Shipping this year (2015)

Exampes of iotadrive™ compute clusters for SKA

	SKA LOW 1	SKA MID 1	SKA SURVEY 1
Processing Required	100 PetaFlops	350 PetaFlops	125 PetaFlops
Iotadrive units	35,000	125,000	44,650
GPU Flops	70 PetaFlops	250 PetaFlops	89.3 PetaFlops
CPU Flops	30 PetaFlops	100 PetaFlops	35.7 PetaFlops
RAM	1,120,000 GB	4,000,000 GB	1,428,800 GB
SSD Storage	210 PetaBytes	750 PetaBytes	268 PetaBytes
Max Power Required	3.8 MW	13.8 MW	4.8 MW
USD Cost	217 Million	775 Million	276 Million

As the input would be DCV – some power could be provided by close proximity Solar Panels or Solid State Geothermal power

Benefits to SKA (Antennae)



MASSIVE reductions in Power Requirements and elimination of a centralized power station

Orders of magnitude reduction in OPEX

Distributed power topology for low large scale down-time

Each Iotadrive can implement Fourier transform and compression in real time.

Each iotadrive powered DIRECTLY in DCV from Solar Panels and has its own battery for up to 12 hours backup (night processing)

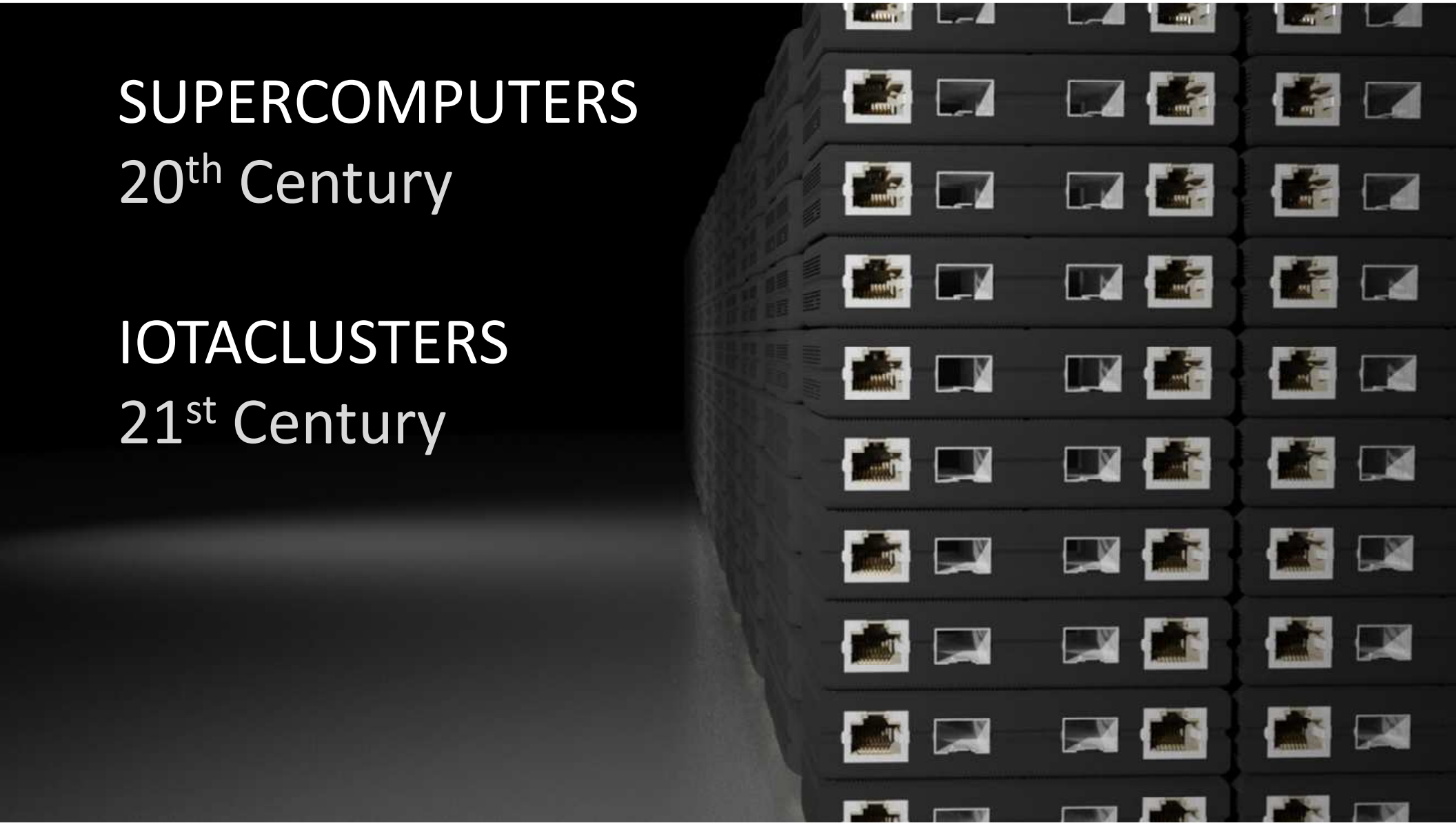
Very low RFI design as NO noisy DC/AC inverters required.

SUPERCOMPUTERS

20th Century

IOTACLUSTERS

21st Century




NYRIAD™
thank you
www.nyriad.com